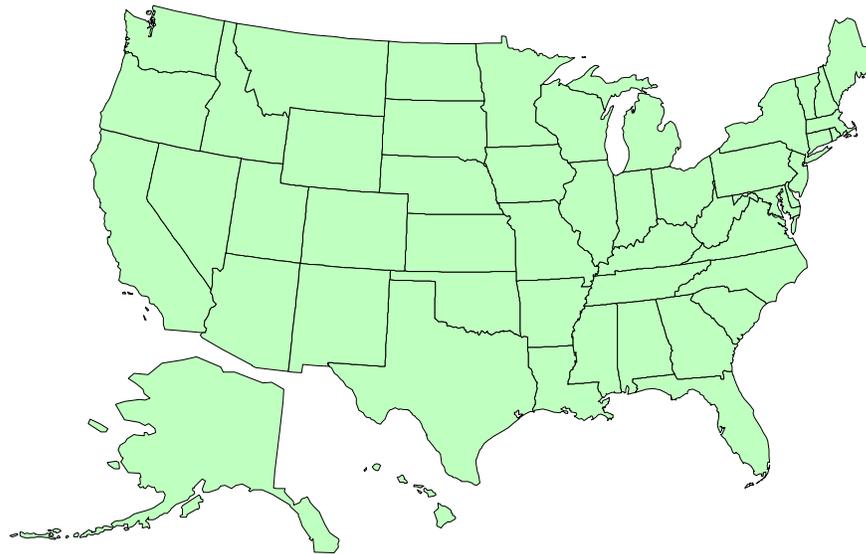




CMAQ in the States:

A Preliminary Assessment of the CMAQ Program's Contribution towards Meeting Ozone Standards



Selected State Profiles

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Overview

PURPOSE

The Congestion Mitigation and Air Quality Improvement (CMAQ) program provides funds to states for projects designed to help metropolitan areas attain and maintain the national ambient air quality standards (NAAQS).¹ Projects eligible for CMAQ funding include transportation control measures (TCMs), public transit, and inspection and maintenance (I&M) programs. Eligibility has recently been expanded to include outreach activities, experimental pilot projects/innovative financing, and fare/fee subsidy programs. The Intermodal Surface Transportation Efficiency Act (ISTEA) created the CMAQ program in 1991, and Congress is now considering reauthorization of ISTEA.

The objective of this analysis is to estimate the potential contribution of the CMAQ program in helping ozone non-attainment areas to move toward attainment of the NAAQS for ozone. Each state containing an ozone non-attainment area classified as serious or above is required to prepare a plan demonstrating how it will achieve a 9-percent rate-of-progress (ROP) reduction in volatile organic compounds (VOC) over the three year period, 1997 to 1999. The 9-percent rate of progress plan for each non-attainment area must be included as part of the State Implementation Plan (SIP). This study compares emission reductions projected for CMAQ projects in specific states against the required 3-percent per year reduction for their non-attainment areas.²

CMAQ program effects were examined for the following six states:³

- California
- Georgia
- New Jersey
- New York
- Pennsylvania
- Texas

In most cases, transportation control measures and other projects funded by CMAQ are not included as measures within State Implementation Plans (SIPs), though they may be included in their future emission estimates. This analysis provides a preliminary assessment of the hypothetical contribution of CMAQ toward required reductions within SIPs. It uses data provided by the states in their FY 1995 CMAQ reports to the Federal Highway Administration (FHWA) and assumptions about potential cost-effectiveness based on national data from the FHWA's FY 1994 CMAQ report. Due to the way their monies are programmed, a few states fund the greatest portion of high priority TCMs from sources other than CMAQ. In these states, use of CMAQ funds is not necessarily associated with emission reductions; therefore, the states have been excluded from consideration in this analysis. Another problem is that some states are very conservative in

¹ According to FHWA Guidance on the CMAQ Program, states with areas that are designated as maintenance or non-attainment areas for ozone or CO must use their CMAQ funds in these areas, except under certain specified conditions. In selecting projects, states are requested to give priority to implementing projects that are included in an approved state implementation plan (SIP) and that will help them attain the air quality standards by the appropriate attainment dates. See "Guidance Update on the Congestion Mitigation and Air Quality Improvement (CMAQ) Program.", Federal Highway Administration, March 7, 1996.

² Use of funds for I&M programs have been excluded from this analysis because such programs are mandatory, and the associated emission reductions will presumably occur even in the absence of CMAQ.

³ These states contain ozone non-attainment areas classified as serious, severe, or extreme, which are subject to 9-percent rate of progress plans.

their reporting of emission reductions. When reductions are difficult to determine, these states report them as zero. Such states have also been excluded from consideration.

FINDINGS

An examination of state-reported CMAQ emission effects suggests that the CMAQ program can contribute substantially toward helping states achieve reasonable further progress (RFP) requirements for their non-attainment areas (RFP and ROP are used synonymously in this paper.). To the extent that state cost-effectiveness could be similar to that at the national level, the CMAQ program has the potential for even larger contributions in many states.

Although transportation control measures have not been included in rate-of-progress plans for most non-attainment areas, this preliminary analysis suggests that CMAQ-funded projects may be contributing up to about 16-percent of the annual 3-percent RFP reductions required in State Implementation Plans. For states that report small contributions in their CMAQ reports, there may be potential for larger reductions if those states could fund a different mix of projects and achieve cost-effectiveness equal to the national median level.

There is a large range, from 1% to 16%, in reported emission reductions from CMAQ projects among the various states. There are many reasons why reported emissions effects differ from state to state, including the following:

- States receive different levels of CMAQ funding
- They spend money on different types of projects, based on local decision-making
- Regional differences in travel patterns, land use, infrastructure, and other factors may mean that potential cost-effectiveness of projects differs
- Methodologies for estimating emission effects may differ (no consistent methodology is applied nationally for reporting CMAQ effects)
- Improper reporting of effects could have occurred.

Table 1 summarizes the results for the six states examined.

TABLE 1
VOC Emission Reductions Attributable to CMAQ (for Non-Attainment Areas in Selected States)

	CALIFORNIA South Coast, San Diego Sacramento, Ventura Co., San Joaquin Valley		GEORGIA Atlanta ¹		NEW JERSEY New York, Philadelphia		NEW YORK New York ²		PENNSYLVANIA Philadelphia		TEXAS Houston/Galveston, Beaumont/Port Arthur	
	tons/ year	tons/ day	tons/ year	tons/ day	tons/ year	tons/ day	tons/ year	tons/ day	tons/ year	tons/ day	tons/ year	tons/ day
Tons Reduced												
FY95 Reported Projects	3,240	13.5	70	0.3	1,060	4.4	1,180	4.9	90	0.4	660	3.5
If cost effective as 50-percentile FY94 project ³	1,700	7.1	220	0.9	670	2.6	1,220	4.8	690	2.7	1,140	4.4
Required Annual 3-percent Reduction	20,000	83.3	3,480	14.5	8,700	36.6	7,440	31.0	4,190	17.5	9,190	38.3
Percent of RFP Requirement⁴												
FY95 Reported Projects	16		2		12		16		2		9	
If cost effective as 50-percentile FY94 project ³	8		6		7		15		16		12	

¹ Emission reduction estimates are for NO_x (The RFP requirement of The Atlanta region focuses entirely on NO_x reduction).

² Two major transit projects were not included in the calculation because of uncertainty over the extent to which the rather large emission reductions reported were attributable to CMAQ funds.

³ Assumes CMAQ projects are as cost-effective as the 50-percentile FY 1994 project nationwide and that all CMAQ spending occurs in non-attainment areas subject to RFP.

⁴ Assumes that FY95 projects begin to reduce emissions in 1997.

Methodology

Contribution toward RFP requirements was estimated by dividing projected annual CMAQ emission effects associated with one-year of spending by the 3-percent per year reasonable further progress requirement, as follows:

$$\text{Contribution to RFP} = \frac{\text{CMAQ Emission Reductions}}{\text{3 percent per year RFP requirement}}$$

For states in which all or most CMAQ funds have been spent in the non-attainment areas subject to RFP, total statewide emission reductions were compared to the sum of 3-percent RFP requirements statewide. For example, most CMAQ funds in Maryland are spent in the Baltimore, Philadelphia, and Washington non-attainment areas (which are subject to RFP), so reported statewide CMAQ emission reductions were compared to the RFP requirements for these three non-attainment areas in Maryland. For the states of California, Illinois, Pennsylvania, and Texas, significant CMAQ funding went to parts of the states not subject to RFP requirements. In these cases, it was not appropriate to compare statewide emission reductions against RFP requirements for a subset of the state. Instead, analyses were conducted to compare CMAQ emission reductions in the non-attainment areas subject to RFP requirements against those requirements.

The calculation of the two components of this fraction is described below.

REASONABLE FURTHER PROGRESS REQUIREMENTS

Definition

All areas of the country classified as moderate or worse (serious, severe, or extreme) for ozone non-attainment must submit to EPA revisions to their State Implementation Plan (SIP) demonstrating how VOC emissions which contribute to the formation of ozone will be reduced by 15-percent between 1990 and 1996. U.S. EPA defines the portion of the SIP revision that illustrates the plan for achievement of this emissions reduction as the rate-of-progress (ROP) plan. Areas classified as serious and worse are required to demonstrate an additional 3-percent per year VOC reduction averaged over each consecutive 3-year period from 1996 until the attainment date. As a result, serious, severe, and extreme areas are required to submit a post-1996 rate of progress plan (also referred to as a 9-percent plan) which includes measures that show how an additional 9-percent reduction will be achieved by 1999. These rate of progress reductions are also referred to as “reasonable further progress (RFP).”

The rate-of-progress reductions are calculated off an adjusted base 1990 emissions inventory. For some states, the 9-percent rate of progress plans are not yet available. For these states, the annual 3-percent per year required VOC reduction was assumed the same as that in the 15-percent plan.

A few non-attainment areas have chosen to reduce oxides of nitrogen (NO_x) in place of some VOC reductions. Section 182 (c) (2) of the Clean Air Act amendments allows states to substitute NO_x emission reductions for VOC reductions to meet the 9-percent rate-of-progress requirement, provided NO_x emission reductions meet the criteria outlined in “EPA’s NO_x Substitution Guidance.” Under this guidance, the sum of

all creditable VOC and NO_x emission reductions must equal 3-percent per year averaged over the three-year period.⁴

Calculation and Use for Comparison

The first step in this analysis was to identify the 9-percent reduction requirements for each non-attainment area subject to reasonable further progress requirements within each state. The 3-percent annual RFP requirements for VOC and/or NO_x were calculated from the 9-percent rate of progress plans within SIPs. Where 9-percent plans were not available, the 3-percent annual reduction was obtained from the 15-percent rate of progress plan.⁵ The RFP requirements for each non-attainment area were then summed statewide.

The emission reductions projected from the CMAQ projects in each state were then compared against the state's 3-percent annual RFP requirements as a means to gauge the hypothetical contribution of CMAQ toward meeting NAAQS for ozone. However, it is important to note that this comparison does not fully address the extent to which CMAQ can help non-attainment areas reach their SIP targets.

The 3-percent per year RFP emissions reduction does not represent the actual emission reduction that must be demonstrated. The state must show that it plans to implement actions that will achieve a 9-percent reduction in VOC emissions (off an adjusted 1990 base inventory) net of growth. In most metropolitan areas, emissions are projected to increase in the absence of any actions, due to VMT growth and other factors. Therefore, non-attainment areas will need to implement programs to reduce emissions more than 3-percent per year compared to levels under no action, in order to offset growth.

On the other hand, the post-1996 plan may require new measures to reduce emissions by less than 9-percent in order to reach the 1999 target. In some cases, the 15-percent plans included federal or statewide measures that were projected to reduce emissions below the target level for 1996. Achieving the 1999 target then requires smaller annual reductions thereafter.

In all cases, the 3-percent per year reasonable further progress requirement may be achieved by emission reductions from all point, area, and mobile sources. The RFP reductions would not be expected to come entirely from on-road mobile sources or from one particular program. Measuring CMAQ progress against the 3-percent requirement merely provides a convenient basis for analytical comparison.

⁴ NO_x is not substituted for VOC on a per ton basis. Rather, a one percent reduction in NO_x can be substituted for a one percent reduction in VOC.

⁵ The 3-percent annual reduction required in the 9-percent rate of progress plan should be similar to that in the 15-percent rate of progress plan since the required reductions in both plans are calculated off a 1990 base emissions inventory, adjusted to exclude emission reductions that would have occurred due to the Federal Motor Vehicle (FMVCP) regulations promulgated by January 1, 1990, and Reid Vapor Pressure (RVP) regulations.

STATE-LEVEL EMISSION REDUCTIONS AND PROGRESS TOWARD RFP

Reported Emission Reductions

The extent to which CMAQ can be viewed as having the potential to help states achieve their RFP requirements was examined by summing CMAQ emissions estimates reported by the states to the Federal Highway Administration.⁶ Emissions data from FY 1995 CMAQ projects were used in this analysis.

Potential Emission Reductions

Given the wide variation in reported emission reductions across states, EPA wanted to have an examination conducted of the potential of CMAQ to reduce emissions assuming that the same cost-effectiveness could be achieved in each state as nationwide. Based on data reported in FHWA's FY 1994 CMAQ report, it appeared reasonable to assume that CMAQ spending on projects within each state could achieve the cost-effectiveness of the 50th percentile project nationwide.⁷

Of course, similar levels of cost-effectiveness in each state's CMAQ program may not in fact occur, given circumstances specific to individual regions and individual needs of each MPO. However, the assumption provides a consistent basis for comparing and estimating emissions reduction potential.

The total state FY 1995 CMAQ apportionment was divided by estimated cost effectiveness (in dollars per ton) to yield tons of emissions reduced. In some cases, these estimates suggest greater reductions than actually reported, while in others they suggest less. The CMAQ cost-effectiveness estimates derive from sets of actual CMAQ-funded projects reported by the states and aggregated nationwide.

Projects and Effects Not Included

Some transportation control measures (TCMs), such as market-based measures and land use planning measures, are difficult to examine in terms of costs, and have not been included in this analysis. EPA and DOT identified market-based measures in their last *Clean Air Act Amendments Report to Congress* as being essentially free (from a cost-effectiveness perspective). Similarly, land use planning measures often are virtually cost-free in terms of government outlays, and both types of measures could result in net revenues to government. In addition, while land use planning measures have the potential to be highly effective in reducing emissions, the considerable time-lags inherent in land use planning suggests that they should not be examined in terms of their contribution to reasonable further progress requirements.

Most CMAQ projects reduce on-road mobile emissions over multiple years. For example, replacement of old transit buses with CNG buses would result in emission reductions over the life of the buses. Therefore, emission reductions associated with the CMAQ program should increase over time as the effects of new projects are added to the continuing effects of projects funded in prior years. However, cumulative emission reductions are not compared directly against RFP requirements since the rate-of-progress plans require new

⁶ Federal Highway Administration, *The Congestion Mitigation and Air Quality Improvement Program: A Summary of Fourth Year Activities (FY 1995: October 1994 – September 1995)*, April 25, 1997. State reports were also used to clarify information within the federal report.

⁷ Cost-effectiveness figures for each category of CMAQ projects were developed from national data from FY 1994 (See report, "The Emissions Reduction Potential of the Congestion Mitigation and Air Quality (CMAQ) Program: A Preliminary Assessment," July 1997, for methodology). National obligations of CMAQ were divided by one-year emission effects (using the 50th percentile estimates for each project category) to determine a dollars per ton figure for all federal CMAQ funds.

reductions each year. In order to be included as a measure in a State Implementation Plan, the action must be one that generates new emission reductions (not already credited in a prior SIP). One-year reductions are compared against the one-year 3-percent RFP requirement.

Specific State Analyses

CALIFORNIA

Ozone Non-attainment Areas

California contains the following eight ozone non-attainment areas:

- LA-South Coast — Extreme (the only one in country)
- Sacramento — Serious (plan proposes bump up to “Severe”)
- San Diego — Severe
- Southeast Desert — Severe
- Ventura County — Severe
- San Joaquin Valley — Serious
- Monterey Bay — Moderate
- Santa Barbara — Moderate



The San Francisco Bay Area is an ozone maintenance area, so it is not subject to RFP requirements.

Reasonable Further Progress (RFP)

The six ozone non-attainment areas classified as serious, severe, and extreme are subject to reasonable further progress requirements. The Southeast Desert did not include any local measures to reduce emissions, since scientific evidence and ozone trends strongly suggest that ozone exceedances are the result of South Coast Air Basin Precursor emissions and that local control of VOC and NO_x emissions will have minimal effect. Based on a 3-percent per year reduction in VOC, all six non-attainment areas statewide would require a reduction of approximately 83.3 tons of VOC per summer day (20,000 tons per year).⁸ Since the South Coast air basin is an extreme non-attainment area, it is a large portion of the total statewide reductions. Removing the South Coast air basin, the other five non-attainment areas require a reduction of 29.3 tons of VOC per summer day (7,040 tons per year).

Potential CMAQ Contributions to RFP

Emission reductions reported by the state of California show a reduction of 18.3 tons of VOC per day (4,390 tons of VOC per year) statewide from FY 1995 CMAQ projects. Assuming these reductions occur in the non-attainment areas in 1997, these reductions comprise about 22-percent of the annual reasonable further progress requirement statewide.

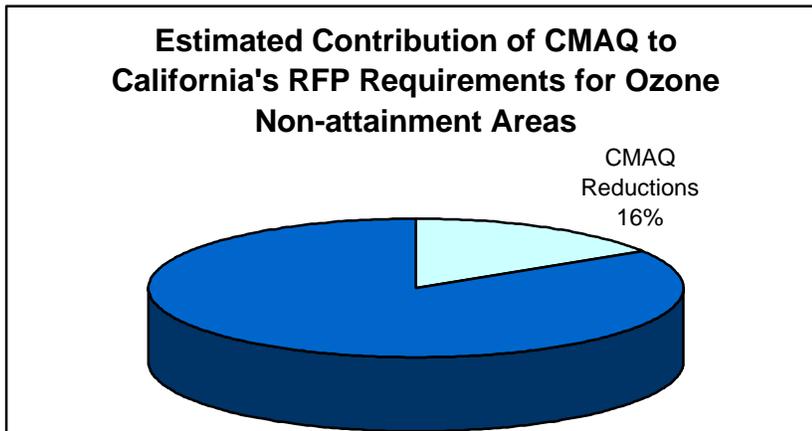
However, since the San Francisco Bay area is a maintenance area, it is not appropriate to consider emission reductions from CMAQ in that area as contributing toward RFP requirements. When the emission reductions from San Francisco area projects are not counted, the CMAQ projects in the six non-attainment areas subject to RFP achieve about 16-percent of the required emission reductions, as shown in Table 2.

⁸ The regional attainment strategies involve both VOC and NO_x reductions.

According to data provided by the state, California CMAQ projects in FY 1995 were more cost-effective than the median U.S. CMAQ projects in FY 1994. Therefore, using a “cut off” criterion of the 50th percentile national cost-effectiveness could underestimate the potential of the program. Still, Table 2 also provides an estimate of effectiveness assuming cost-effectiveness at the national median and assuming that all of California’s \$142 million apportionment goes toward RFP reductions.

Table 2: Reported and Estimated Single-Year Emission Reductions in California from CMAQ

RFP Requirement	VOC Emission Reductions		Percentage of statewide 3-percent RFP requirements
	tons per day	tons per year	
Required Annual Reduction	83.3	20,000	-
Reported CMAQ Effect			
FY 1995 Report (update), Total State minus San Francisco	13.5	3,240	16%
Potential CMAQ Effect			
Assuming projects were as cost-effective as the 50 th percentile FY94 project nationwide	7.1	1,700	8%



GEORGIA

Ozone Non-attainment Area

The Atlanta region is the only ozone non-attainment area in the state of Georgia. Con



Reasonable Further Progress (RFP)

Unlike many other non-attainment areas, the Atlanta region has developed a 9-percent rate-of-progress plan that focuses entirely on reduction of oxides of nitrogen (NO_x). The region must reduce approximately 14.5 tons of NO_x per summer day (3,480 tons per year) each year over the period of 1996 to 1999 (Its 15-percent reduction plan focused on measures to reduce VOC emissions by 15-percent between 1990 and 1996.). Beyond 1999, the Atlanta region could decide to focus on reducing VOC and/or Ox.

Potential CMAQ Contributions to RFP

According to data from the State of Georgia, all CMAQ projects implemented in the state in 1995 were implemented in the Atlanta non-attainment area. Consequently, it is appropriate to compare the statewide CMAQ emission reductions against the RFP requirement of the Atlanta region.

Many of the CMAQ projects implemented since the inception of the program have been more successful in reducing VOC than NO_x emissions. The greater emphasis on VOC reductions make sense, since the Atlanta region's 15-percent rate-of-progress plan for 1991 to 1996 focused entirely on VOC reductions. In fact, a number of traffic flow improvements funded by CMAQ, including the regional Advanced Transportation Management System (ATMS) projects, were reported in 1994 to increase NO_x emissions in the short term.⁹ However, the NO_x reductions reported by the state in the FY 1995 report showed a small positive contribution to RFP—0.3 tons per day (70 tons per year), or 2-percent of the RFP requirement. In 1995, the state reported VOC reductions of 2.2 tons per day (530 tons per year).

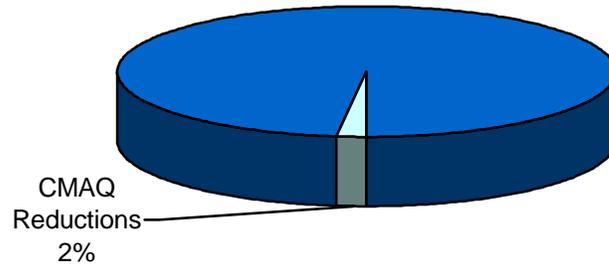
If CMAQ projects in the Atlanta region were as cost-effective as the national median project, the region could potentially achieve a more significant share of its 3-percent NO_x RFP requirement through the CMAQ program. Assuming that the Georgia apportionment of CMAQ funds remains at approximately \$14.9 million, the CMAQ program could reduce about 0.9 tons of NO_x per day (220 tons per year), or 6-percent of the RFP requirement, as shown in Table 3.

⁹ Estimates of the emissions effect of FY 1995 projects in 1999 that were used in this analysis correspond to the RFP requirement for 1997 to 1999. The Atlanta Regional Commission estimated the emissions effects of CMAQ projects in 1996, 1999, 2005, and 2010. The FHWA CMAQ Annual Report only records the 1996 reductions for Georgia.

Table 3: Reported and Estimated Single-Year Emission Reductions in Georgia from CMAQ

	NO _x Emission Reductions		Percentage of statewide 3-percent RFP requirements
	tons per day	tons per year	
RFP Requirements			
Required Annual Reduction	14.5	3,480	-
Reported CMAQ Effect			
FY 1995 Report (1999 reductions)	0.3	70	2%
Potential CMAQ Effect			
Assuming projects were as cost-effective as the 50 th percentile FY94 project nationwide	0.9	220	6%

Estimated Contribution of CMAQ to Georgia's RFP Requirement for the Atlanta Ozone Non-attainment Area



NEW JERSEY

Ozone Non-attainment Areas

The State of New Jersey includes the following ozone non-attainment areas:

- New York-New Jersey-Long Island — Severe (portion)
- Philadelphia-Wilmington-Trenton — Severe (portion)
- Atlantic City — Moderate



Reasonable Further Progress (RFP)

The New York metropolitan area and the Philadelphia-Wilmington-Trenton area are the two non-attainment areas in New Jersey required to meet a 9% rate of progress for VOC emission reductions from 1997 to 1999. The 3% annual RFP reduction for the state totals 36.3 tons of VOC per summer day (8,700 tons per year), of which 26.3 tons per day (6,310 tons per year) are in the New York non-attainment area and 10.0 tons per day (2,390 tons per year) are in the Philadelphia non-attainment area.¹⁰ Since most CMAQ funds are spent in these two non-attainment areas, the statewide CMAQ reductions were compared against the RFP requirements in these two areas within New Jersey.

Potential CMAQ Contributions to RFP

New Jersey reported a reduction of 4.4 tons of VOC per day (1,060 tons per year) from its FY 1995 projects, or approximately 12-percent of the state's RFP requirement. Employer trip reduction was included as a measure in the state's 24-percent rate-of-progress plan (which includes the 15-percent reduction through 1996 and the 9-percent reduction through 1999). It is estimated that the employer trip reduction package will reduce VOC emissions by 2.3 tons per day (840 tons per year) in the New York City area and 0.6 tons per day (220 tons per year) in the Philadelphia areas of New Jersey.

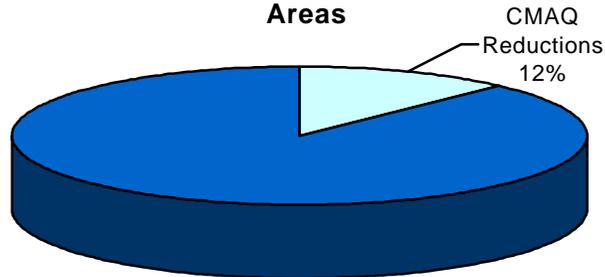
These emission reduction estimates reported by the state are greater than those that would occur if the New Jersey projects were as cost-effective as the 50th percentile FY 1994 project nationwide. Under such an assumption, the CMAQ program would reduce about 2.6 tons of VOC per day or 7% of the RFP requirement (670 tons per year), as shown in Table 6.

¹⁰ These plans include NO_x substitution. The reductions were calculated from the state's 24-percent rate of progress plan that includes a 15-percent reduction by 1996 and a further 9-percent reduction by 1999.

Table 6: Reported and Estimated Single-Year Emission Reductions in New Jersey from CMAQ

	VOC Emission Reductions		Percentage of statewide 3-Percent RFP requirements
	tons per day	tons per year	
RFP Requirement			
Required Annual Reduction	36.3	8,700	-
Reported CMAQ Effect			
FY 1995 Report	4.4	1,060	12%
Potential CMAQ Effect			
Assuming projects were as cost-effective as the 50 th percentile FY94 project nationwide	2.6	670	7%

Estimated Contribution of CMAQ to New Jersey's RFP Requirement for the New York and Philadelphia Ozone Non-attainment Areas



NEW YORK

Ozone Non-attainment Areas

The State of New York includes the following ozone non-attainment areas:

- New York-New Jersey-Long Island — Severe (portion)
- Albany-Schenectady-Troy — Marginal
- Buffalo-Niagara Falls — Marginal
- Essex County — Marginal
- Jefferson County — Marginal
- Poughkeepsie — Moderate



Reasonable Further Progress (RFP)

The New York metropolitan area is the only non-attainment area in New York State required to meet a 9% rate of progress over 1997 to 1999. The 3% annual reasonable further progress (RFP) reduction for the area totals 31.0 tons of VOC per summer day (7,440 tons per year).

Potential CMAQ Contributions to RFP

FY 1995 CMAQ-funded projects in the State of New York were projected to reduce VOC emissions by approximately 17.4 tons per day (4,180 tons per year), not including reductions associated with inspection and maintenance (I&M) program test stations. Assuming these figures are correct, these projects would contribute 56-percent toward the RFP requirement for the New York/Lower Orange County metropolitan areas. If emission reductions associated with two projects that report especially large effects are eliminated (MTA intermodal facility and a transit center),¹¹ then New York CMAQ projects would reduce about 4.9 tons per day (1,180 tons per year), or 16-percent of the RFP requirement.

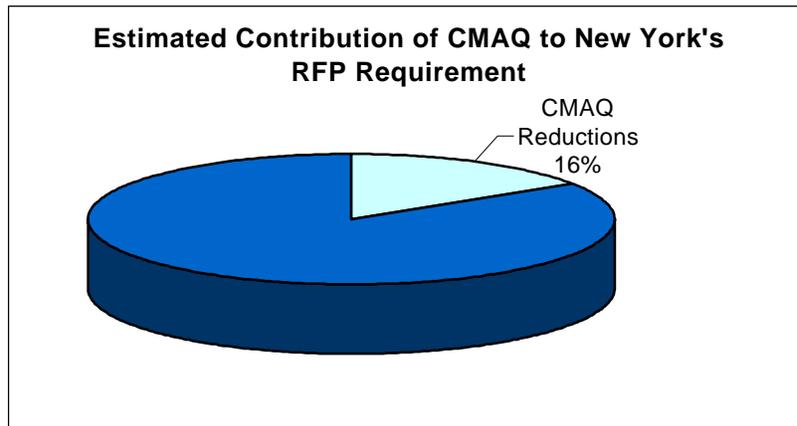
Another measure of progress when comparing emission reductions against the RFP requirement comes from the TIP for the New York-New Jersey-Long Island area. Emission reductions from FY 1994 and FY 1996 projects were projected to reduce from 0.4 to 2.4 tons of VOC per day (100 to 580 tons per year), which amounts to 1% to 8% of the RFP requirement.

Assuming that New York projects were as cost-effective as the 50th percentile FY 1994 project nationwide, the CMAQ program could reduce 4.8 tons of VOC per day (1,220 tons per year). These reductions would total 15-percent of the RFP requirement, as shown in Table 7.

¹¹ Attributing the entire amount of the large emission reductions reported for these projects to the CMAQ program is not accurate, given that only a small amount of CMAQ funds contributed to these projects. The remaining programs include CMAQ projects funded statewide, rather than only those in the severe non-attainment area.

Table 7: Reported and Estimated Single-Year Emission Reductions in New York from CMAQ

One-year Reductions	VOC Emission Reductions		Percentage of statewide 3-Percent RFP requirements
	tons per day	tons per year	
RFP Requirement			
Required Annual Reduction	31.0	7,440	-
Reported CMAQ Effect			
FY 1995 Report ¹²	17.4	4,170	53%
FY 1995 Report, minus questionable reported effects from two projects	4.9	1,180	16%
Potential CMAQ Effect			
Assuming projects were as cost-effective as the 50 th percentile FY94 project nationwide	4.8	1,220	15%



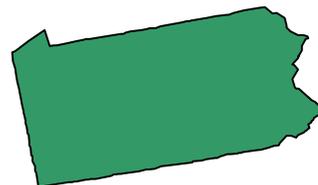
¹² Six I/M projects with a total reported emission reduction of 82 tons per day were excluded from the calculation since I/M is a mandatory program. It is unclear whether these project effects should be attributed to the CMAQ program.

PENNSYLVANIA

Ozone Non-attainment Areas

The State of Pennsylvania includes the following non-attainment areas:

- Philadelphia-Wilmington-Trenton — Severe (portion)
- Pittsburgh-Beaver Valley — Moderate
- Altoona — Marginal
- Erie — Marginal
- Harrisburg-Lebanon-Carlisle — Marginal
- Johnstown — Marginal
- Lancaster — Marginal



Reasonable Further Progress (RFP)

Only the Philadelphia-Wilmington-Trenton severe non-attainment area is subject to a 3-percent RFP requirement. The Pennsylvania portion of this non-attainment area has an RFP requirement of approximately 17.5 tons of VOC per summer day.¹³

Potential CMAQ Contributions to RFP

The State of Pennsylvania's annual CMAQ reports show a relatively small VOC reduction attributable to CMAQ. It reports 110 tons of VOC reduced per year from FY 1994 projects, 0.6 tons per day (140 tons per year) from FY 1995 projects and 100 tons per year from FY 1996 projects. The FY 1996 report shows a smaller emissions effect than the FY 1995 report because of a decline in CMAQ obligations. In FY 1995, \$191.7 million in federal CMAQ funds were obligated (a 326% obligation rate), while only \$25.9 million were reported obligated in FY 1996. Reported project cost-effectiveness (in dollars per ton) increased from FY 1995 to FY 1996.

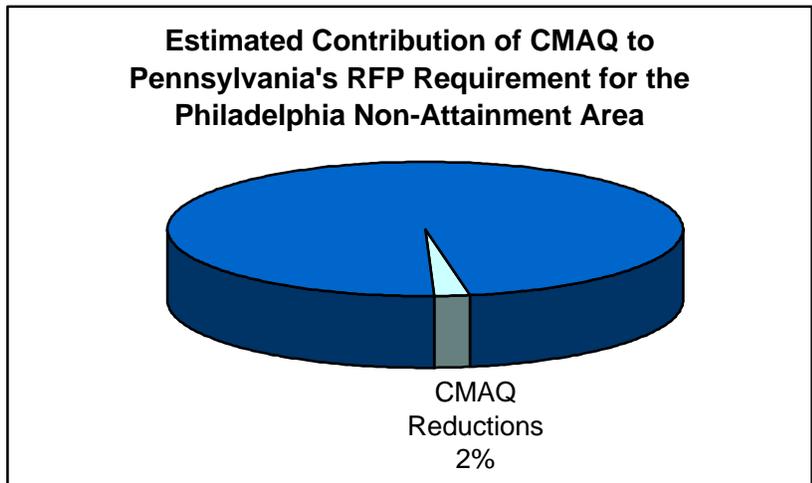
Since the RFP requirement only applies to the Philadelphia-Wilmington-Trenton non-attainment area, only the VOC reductions associated with CMAQ projects in this area were calculated. These projects reduced 0.4 tons per day (90 tons per year) in 1995, and contributed 2-percent of the RFP reductions.

The reported cost-effectiveness of CMAQ projects in Pennsylvania is lower than the median reported cost-effectiveness of projects nationwide. This lower cost-effectiveness could be due to conditions specific to Pennsylvania, differences in emissions estimation methodology or assumptions, or other factors. If reductions at the median level of cost-effectiveness were feasible and all reductions were in the Philadelphia non-attainment area, the CMAQ program would constitute approximately 16% of the required RFP emission reductions.

¹³ The 9-percent rate of progress plan has not yet been completed. The 3-percent per year reduction was calculated from the Philadelphia non-attainment area State Implementation Plan Revision 15 Percent Rate of Progress Plan.

Table 8: Reported Single-Year Emission Reductions in Pennsylvania from CMAQ

	VOC Emission Reductions		Percentage of statewide 3-Percent RFP requirements
	tons per day	tons per year	
RFP Requirement			
Required Annual Reduction	17.5	4,190	-
Reported CMAQ Effect			
FY 1995 Report, Statewide	0.6	140	3%
FY 1995 Report, Philadelphia area only	0.4	90	2%
Potential CMAQ Effect			
Assuming projects were as cost-effective as the 50 th percentile FY94 project nationwide	2.7	690	16%



TEXAS

Ozone Non-attainment Areas

The state of Texas contains four ozone non-attainment areas, classified as follows:

- Houston-Galveston-Brazoria — Severe
- Beaumont-Port Arthur — Serious
- El Paso — Serious
- Dallas-Ft. Worth — Moderate



Reasonable Further Progress (RFP)

Although Texas contains three non-attainment areas that are serious or severe, only the Houston-Galveston-Brazoria and Beaumont-Port Arthur areas have developed 9-percent plans. The El Paso area has demonstrated through modeling that its ozone problem stems from precursor emissions in Mexico, so it is not developing a plan for RFP. For the two non-attainment areas in Texas subject to the RFP requirement, a 3-percent annual reduction equals 38.3 tons of VOC per summer day (9,190 tons per year), of which 28.9 tons per day (6,940 tons per year) are in Houston-Galveston-Brazoria and 9.4 tons per day (2,250 tons per year) are in Beaumont-Port Arthur.¹⁴

Potential CMAQ Contributions to RFP

According to CMAQ reports submitted by the state of Texas to the Federal Highway Administration (FHWA), projects funded by CMAQ in FY 1995 reported reductions of about 6.2 tons per summer day, or nearly 1,490 tons of VOC per year statewide. These emission reductions constitute approximately 16-percent of the RFP requirement statewide.¹⁵ Some of these reductions would occur, however, in parts of Texas not subject to RFP.

In order to provide a more valid comparison, the emission reductions associated with projects in the Houston and Beaumont-Port Arthur areas were isolated. These projects were expected to reduce approximately 3.5 tons of VOC per day (660 tons per year), or 9-percent of the RFP requirement in these areas.

Reported Texas projects have been relatively cost-effective compared to all projects reported nationwide. In order to estimate potential effectiveness consistently with other states, Texas projects were assumed as effective as the 50th percentile project nationwide in FY 1994. At this level of cost-effectiveness, the emission reductions from CMAQ would constitute 4.4 tons of VOC per day (1,140 tons per year), as shown in Table 9.

¹⁴ These requirements were calculated from the 9% rate-of-progress plans for Houston/Galveston and Beaumont/Port Arthur.

¹⁵ The emission reductions reported for FY1995 projects is significantly higher than that of FY 1994 projects, in part because emissions effects were reported for a higher portion of all projects in the more recent report. In addition, the amount of funding obligated increased from \$72.8 million to \$94.3 million. The percentage of apportioned funds that have been obligated has increased from 0% in 1992, 32.1% in 1993, 76.4% in FY 1994, to 97.4% in FY 1995.

Table 9: Reported and Estimated Single-Year Emission Reductions in Texas from CMAQ

	VOC Emission Reductions		Percentage of statewide 3-Percent RFP requirements
	tons per day	tons per year	
RFP Requirement			
Required Annual Reduction	38.3	9,190	-
Reported CMAQ Effect			
FY 1995 Report, statewide	6.2	1,490	16%
FY 1995 Report, Houston and Beaumont only	3.5	660	9%
Potential CMAQ Effect			
Assuming projects were as cost-effective as the 50 th percentile FY94 project nationwide	4.4	1,140	12%

